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10/519,349	07/08/2005	Rainer Hillenbrand	46955.20	2984

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EXAMINER	
IGYARTO, CAROLYN	

ART UNIT	PAPER NUMBER
2884	

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11/16/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/519,349

Applicant(s)

HILLENBRAND ET AL.

Examiner

Carolyn Igyarto

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 30 August 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-36 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 27 December 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 11 February 2005.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d) and/or 365(a)-(b), which papers have been placed of record in the file.

### ***Information Disclosure Statement***

2. The information disclosure statement submitted on 11 February 2005 has been considered by the Examiner and made of record in the application file.

### ***Response to Preliminary Amendment***

3. Preliminary amendment, received 30 August 2007, has been entered.

### ***Specification***

4. The disclosure is objected to because of the following informalities: Fig. 1, Fig. 4, and Fig. 5 are referred to on pages 10-11 of the specification. However, Figs. 1a-f, 4a-b, and 5a-c exist.

Appropriate correction is required.

***Drawings***

5. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: R. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Objections***

6. Claim 26 is objected to because of the following informalities: line 2 recited "near-filed"; instead "near-field" should be recited. Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1-11, 19-20, and 23-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Knoll et al. ("near-field probing of vibrational absorption for chemical microscopy," Nature, Vol. 399, May 1999, pg. 134-136.), hereinafter referred to as Knoll.

9. With respect to **claim 1**, Knoll teaches a method for acquiring optical near-field interaction signals in the infrared spectral region (page 134, col. 2, lines 61-66), comprising the steps of:

illumination of an object combination comprising at least two objects (page 135, col. 1, line 20) with infrared radiation (page 135, col. 1, line 33) so that an infrared near-field coupling is generated between the objects (page 134, col. 2, lines 63-66; page 135, col. 1, lines 40-41);

and acquisition the scattered light which is scattered by the object combination, which scattered light comprises a fraction(s) that has been modified as a result of the near-Field coupling (page 134, col. 2, lines 61-66; page 136, col. 1, lines 32-33 and 42), wherein

at least one of the objects comprises a polar material which at least in part comprises a polar solid-state structure (page 135, col. 1, lines 23-25 and 46-47); and

during illumination in at least one of the objects with the polar material at least one phonon resonance is excited with which the modified fraction(s) of the

scattered light is strengthened (page 135, col. 1, line 51 through col. 2, line 6; page 136, col. 1, lines 32-33).

10. With respect to **claim 2**, Knoll teaches acquiring the modified fraction(s) comprises infrared detection with a detector device (page 135, col. 1, lines 39-40).
11. With respect to **claim 3**, Knoll teaches one of the objects which forms a sample comprises a solid-state surface, an adsorbate on a solid-state surface, or a solid material (Fig. 2; page 134, col. 2, lines 62-64; page 135, col. 1, lines 43-44).
12. With respect to **claim 4**, Knoll teaches one of the objects which forms a probe comprises a scanning tip of a near-field microscope (page 134, col. 2, lines 61-66), a reading head (page 135, col. 1, lines 23-26) or at least one particle embedded, or suspended in a solid material (page 135, col.1, lines 14-15 and 24-25).
13. With respect to **claim 5**, Knoll teaches for optical near- field microscopy the probe and a sample (page 135, col. 1, line 20) which is to be examined and which forms the associated second object of the object combination are moved step by step relative to each other, and in which method spatially resolved detection of the modified fraction(s) takes place (page 134, col. 2, lines 62-66).

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14. With respect to **claim 6**, Knoll teaches for optical near-field microscopy, illumination of the object combination takes place with infrared radiation of different wavelengths, wherein in each case spectrally specific detection of scattered light occurs (page 136, col. 1, lines 32-36 and col. 2, line 4).

15. With respect to **claim 7**, Knoll teaches the measured scattered light, which fraction has been modified by the near-field coupling, is subjected to spectral analysis (Fig. 3; page 136, col. 2, lines 30-31).

16. With respect to **claims 8 and 24**, Knoll teaches for the purpose of reading out optically stored data, the probe as a reading head is moved over a data carrier which forms the associated second object of the object combination (page 134, col. 2, lines 61-65), and detection of a data structure takes place, which data structure has been placed onto, impresses into, or arranged underneath the surface of the data carrier (Fig. 2; page 135, col. 1, lines 41-45).

17. With respect to **claim 9**, Knoll teaches the sample or the data carrier comprises a topography-free surface which comprises structures with differences in the refractive index and with characteristic dimensions which are smaller than 10  $\mu\text{m}$  (Fig. 2; page 134, col. 2, lines 61-65; page 135, col.1, lines 18-20).

18. With respect to **claim 10**, Knoll teaches the acquisition of the modified fraction(s) comprises resonant excitation of at least one adjacent object of a polar material (page 135, col. 1, lines 46-47; page 136, col. 1, line 33 and col. 2, line 27).

19. With respect to **claim 11**, Knoll teaches with acquisition of the modified fraction(s) at least one row of objects out of a multitude of objects of a polar material is resonantly excited (page 135, col. 1, lines 23-25 and 42-45; Fig. 1; page 136, col. 1, lines 20-21).

20. With respect to **claim 19**, Knoll teaches a method for infrared spectroscopic examination of a sample, which comprises several components or phases, in which the sample is subjected to scattered-light detection, and the components or phases are acquired or analysed depending on the occurrence of specified phonon resonances (Fig. 3, pg 134, col. 2, lines 61-65; pg 136, col. 1, lines 32-34 and col. 2, lines 30-31).

21. With respect to **claim 20**, Knoll teaches a measuring arrangement for measuring the scattered light in the infrared spectral region (page 134, col. 2, lines 61-66), comprising,

an illumination device for generating infrared radiation (page 135, col. 1, line 33);

a probe device which is arranged so as to be movable at some distance from a sample (page 134, col. 2, line 62; page 135, col. 1, lines 18-22); and



a detector unit with which the infrared radiation scattered on the probe device is detectable (page 134, col. 2, line 61; page 135, col. 1, lines 39-40), wherein the probe device comprises at least one probe which at least partly comprises a material with a polar solid-state structure (page 135, col. 1, lines 23-25 and 46-47, and col. 2, line 5).

22. With respect to **claim 23**, Knoll teaches the measuring arrangement is designed as an optical near-field microscope with a scanning tip which carries the probe, and a laser-detector combination for controlling the position of the scanning tip (page 134, col. 2, lines 61-66; page 135, col. 1, lines 33 and 38-40).

23. With respect to **claim 25**, Knoll teaches the measuring arrangement is designed as a chemical (Fig. 3; page 136, col. 2, lines 30-31) or physical sensor device (Fig. 2; page 134, col. 2, lines 63-66).

### ***Claim Rejections - 35 USC § 103***

24. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

25. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

26. Claims 12-16, 18, 22, and 26-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Knoll as applied to claims 1, 10-11 and 20 above, and further in view of Martin et al. ("Optical data storage read out at 256 Gbits/in.<sup>2</sup>", Applied Physics Letters, Vol. 71, 1997, pg. 1-3.), hereinafter referred to as Martin.

27. With respect to **claims 13 and 26**, Knoll teaches all of the limitations of claims 1 and 10, as explained above. Knoll does not explicitly teach physical characteristics, in particular the crystal structure, band structure or charge carrier density of at least one object or of a surrounding of at least one object, are modulated with electromagnetic, electric or magnetic fields so that the dielectric characteristics of the object are changed and the modified fraction(s) of the scattered light which is scattered on the object is modulated accordingly. Martin, however, teaches physical characteristics, in particular the crystal structure, band structure or charge carrier density of at least one object or of

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a surrounding of at least one object, are modulated with electromagnetic, electric or magnetic fields so that the dielectric characteristics of the object are changed and the modified fraction(s) of the scattered light which is scattered on the object is modulated accordingly (pg. 1, col. 1, line 28) for the benefit of storing data to be later read.

Therefore, it would have been obvious to one of ordinary skill at the time of the invention to include the write capabilities, taught by Martin, with the read capabilities, taught by Knoll, for the benefit of storing data to be later read.

28. With respect to **claim 14**, Martin further teaches the physical characteristics of the respective object or of its surroundings are modified with high-frequency or low-frequency electromagnetic fields (pg. 1, col. 1, line 28).

29. With respect to **claim 15**, Martin further teaches the physical characteristics of an object which is arranged on a branch are modified (pg. 1, col. 1, line 28).

30. With respect to **claim 16**, Knoll further teaches the modulation of the modified fraction(s) of the scattered light is detected and used as an optical switching signal or for near-field illumination of further object combinations (pg. 134, col. 2, lines 61-63).

31. With respect to **claims 18, 22, 31, and 34-36**, Knoll teaches all of limitations of claims 1 and 20, as explained above. Knoll further teaches using gold on a silicon wafer (pg. 135, col. 1, line 43), but does not teach the polar material comprises a ferroelectrical material, SiC, Si<sub>3</sub>N<sub>4</sub>, CaPO<sub>3</sub>, CaCO<sub>3</sub> or SiO<sub>2</sub>. Martin teaches using

SiO<sub>2</sub> on a silicon wafer (pg. 1, col. 1, lines 29-30). It would have been obvious to one of ordinary skill at the time of the invention to use SiO<sub>2</sub>, as taught by Martin, in place of the gold, taught by Knoll, for the benefit of decreasing costs.

32. With respect to **claim 27**, Knoll further teaches at least one detector device with which the infrared radiation scattered on the objects is detectable (pg. 135, col. 1, lines 38-40).

33. With respect to **claim 28**, Knoll further teaches at least one row comprising a multitude of objects of a polar material is provided, which objects, when at least one combination of two adjacent objects is illuminated, are mutually excitable so as to be resonant (pg. 134, col. 2, lines 61-65; pg 136, col. 1, lines 20-21).

34. With respect to **claims 12 and 29**, Knoll teaches all of the limitations of 1 and 10-11, as explained above. Knoll further teaches the polar materials being scanned are resonantly excited (pg. 135, col. 2, line 5; pg 136, col. 1, lines 33-34). Knoll does not explicitly teach several rows of objects are interconnected by means of at least one branch. Martin teaches structuring a high density bit pattern, similar to that found on a CD, as the material being read, or scanned, by a probe tip and therefore having several rows of objects that are connected by means of at least one branch (pg. 2, col. 1, lines 28-29). Therefore, it would have been obvious to one of ordinary skill at the time of the invention to the material being scanned, as taught by Knoll, to be arranged in several

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rows of objects connected by means of at least one branch, as taught by Martin, for the benefit of better organizing the data.

35. With respect to **claim 30**, Knoll, as modified above, does not explicitly teach the objects comprise a III-V-, IV-IV- or IV-VI- semiconductor. However, it is known in the art to use SiC, which is a IV-IV-, to increase scattering of light. Therefore, it would have been obvious to one of ordinary skill at the time of the invention to use SiC, which is a IV-IV-, as is known in the art, for the benefit of increasing the scattering of light.

36. With respect to **claim 32**, Knoll further teaches the optical modulator forms an optical circuit (pg. 134, col. 2, lines 61-63).

37. With respect to **claim 33**, Knoll, as modified above, does not explicitly teach the illumination device, the detector device, or both, are arranged on the substrate. However, it is known in the art to arrange illumination devices and/or detector devices on a substrate for the benefit of producing the system more economically. Therefore, it would have been obvious to one of ordinary skill at the time of the invention to arrange illumination devices and/or detector devices on a substrate, as is known in the art, for the benefit of producing the system more economically

38. **Claims 17 and 21** are rejected under 35 U.S.C. 103(a) as being unpatentable over Knoll, as applied to claims 1 and 20.

Knoll does not explicitly teach the objects comprise a III-V-, IV-IV- or IV-VI-semiconductor. However, it is known in the art to use SiC, which is a IV-IV-, to increase scattering of light. Therefore, it would have been obvious to one of ordinary skill at the time of the invention to use SiC, which is a IV-IV-, as is known in the art, for the benefit of increasing the scattering of light.

### ***Conclusion***


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Carolyn Igyarto whose telephone number is (571) 270-1286. The examiner can normally be reached on Monday - Thursday, 7:30 A.M. to 5 P.M. E.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dave Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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